Common Exam 2

8:30-9:45 am Friday, Oct. 30th (Arrive by 8:15 am)

TIER 116 (Tiernan Lecture Hall 1)

Bring calculators

B1: Chap 4, B2: Ch.6, Up to "Other Application of Newton's Laws"

To combat cheating, while taking the exams
1)students must show their ID upon entering the classroom,
2) no cell phone use,
3) if a student leaves the room during test time, e.g.Men's/Ladies' room, he/she forfeits finishing the exam.

Formula sheet, sample problems and old exmas : Check course web.

http://web.njit.edu/~kenahn

Review session : Oct. 29 Thursday class

HW #8: Appl. Of Newton's Laws (Due 1pm central time, Oct. 26, Monday)

1

Last Class…

B2. Ch6. Sec.1-2 : Circular Motion

Uniform Circular Motion

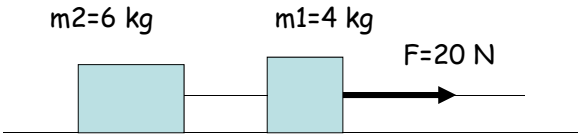
Non-uniform circular Motion

Today..

Other Application of Newton's Laws (B.2, Ch.6, S.3-4)

2

Example: Multiple objects moving together.



Frictionless surface

iClicker: Find the acceleration.

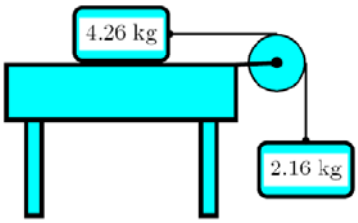
(a) 5 m/s^2
(b) 2 m/s^2
(c) 10 m/s^2
(d) 20 m/s^2
(e)(20/6) m/s^2

Example: Find the tension in the rope between the two blocks.

3

Example: Two objects moving together

007 (part 1 of 2) 8 points
A block of mass 4.26 kg lies on a frictionless horizontal surface. The block is connected by a cord passing over a pulley to another block of mass 2.16 kg which hangs in the air, as shown on the following picture. Assume the cord to be light (massless and weightless) and unstretchable and the pulley to have no friction and no rotational inertia.
The acceleration of gravity is 9.8 m/s^2.



Calculate the acceleration of the first block.
Answer in units of m/s^2.

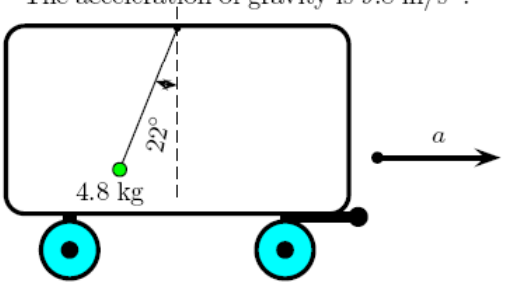
008 (part 2 of 2) 7 points
Calculate the tension in the cord. Answer in units of N.

4

006 (part 1 of 1) 10 points

A 4.8 kg object hangs at one end of a rope that is attached to a support on a railroad boxcar. When the car accelerates to the right, the rope makes an angle of 22° with the vertical

The acceleration of gravity is 9.8 m/s^2.



Find the acceleration of the car. (**Hint:** $\vec{a}_{object} = \vec{a}_{car}$)

iClicker Quiz

Net force on the object is

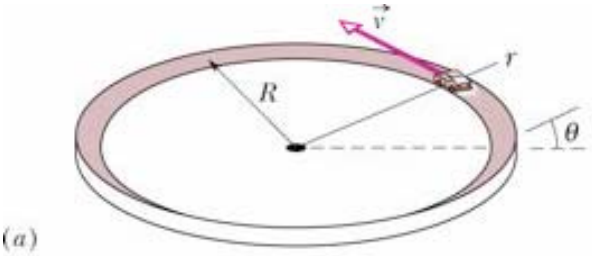
(a) zero.

(b) Not zero.

5

Example

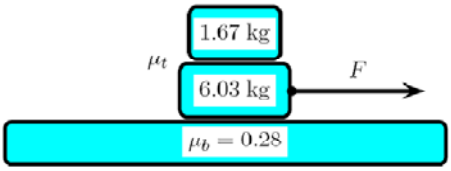
Curved portions of highways are always banked (tilted) to prevent cars from sliding off the highway. When a highway is dry, the frictional force between the tires and the road surface may be enough to prevent sliding. When the highway is wet, however, the frictional force may be negligible, and banking is then essential. Figure represents a car of mass *m* as it moves at a constant speed *v* of 20 m/s around a banked circular track of radius *R* = 190 m. If the frictional force from the track is negligible, what bank angle θ prevents sliding?



004 (part 1 of 2) 10 points

A 1.67 kg block is placed on top of a 6.03 kg block. The coefficient of kinetic friction between the 6.03 kg block and the surface is 0.28. A horizontal force F is applied to the 6.03 kg block.

The acceleration of gravity is 9.8 m/s^2 .



Calculate the magnitude of the force necessary to pull both blocks to the right with an acceleration of 3.69 m/s^2. Assume no slipping between the two blocks. Answer in units of N.

Two blocks moving together
→ Treat like one big block

005 (part 2 of 2) 10 points

Find the minimum coefficient of static friction μ_t between the blocks such that the 1.67 kg block does not slip under an acceleration of 3.69 m/s^2.

Focus on upper block.

Net force on it should be the static friction.